Code: 1505-33174

FEDERAL REPUBLIC OF GERMANY

GERMAN PATENT OFFICE

PATENT NO: 4,023,418 A1

(Offenlegungsschrift)

Int. Cl.[5]:	C 11 D 3/36 C 11 D 1/40 // (C11D 3/36,3:33,1:04,1:40)
Application No.:	P 40 23 418.5
Filing Date:	July 23, 1990
Laid-Open to Public Inspection:	February 6, 1992

COMPOSITION FOR CLEANING CONTAMINATED FRUIT AND VEGETABLES

Applicant:	Seifenfabrik Budich GmbH, 4901 Hiddenhausen, DE
Inventors:	Meinrad Budich, 4977 Huellhorst, DE
Agents:	H. Tiedtke, G. Buehling, R. Kinne, P. Grupe, H. Pellmann, K. Grams, B. Struif, Patent Attorneys, 8000 Munich

Examination request made according to Section 44, Patent Law.

A composition for cleaning contaminated fruit and vegetables is described, which consists of neutralized fatty acids, citrate, ethanol, and perhaps phosphates and/or ethylenediaminetretracetic acid (EDTA). The components of the composition are raw materials which have been approved for foods. Contaminations of fruit and vegetables can be effectively removed with the composition, without the taste and optical characteristics of the products being impaired.

Description

In the cultivation of fruit and vegetables, these products are exposed to numerous contaminations, which act directly or indirectly on the products. Indirect contaminations can be introduced by means of air, the soil, or water, among which are, in particular, heavy metal contaminations, such as lead, mercury, and cadmium.

In addition, it is common to protect fruit and vegetable during cultivation against attacks by pests or against weeds. Thus, to a considerable extent, pesticides, fungicides, and herbicides are used in the cultivation of fruit and vegetables, before the products reach the consumer. These organic pollutants are in part once again degraded, but the numerous contaminants add up to considerable effects.

Normally, fruit and vegetables in the household are cleaned with water with more or less mechanical support before consumption or before preparation for consumption. This measure corresponds also to a recommendation of commissions of the Federal Health Office, which recommend washing with water before consumption. However, washing with water with the aforementioned

multiple contaminations, which are based on very different chemical compounds, does not always lead to pollutants being below the standard values valid at present, which is desirable, however, with respect to protection of the consumer.

The use of cleaning agents--for example, in the household--is very widespread. With traditional cleaning agents, as they are used to wash dishes and clothing and to clean surfaces, synthetically produced surfactants and sequestering agents, which have not been approved for the treatment of foods, such as fruit and vegetables, are used, as a rule. Furthermore, such cleaning agents are, as a rule, used at higher temperatures, since a better cleaning performance is attained. In the cleaning of fruit and vegetables, however, there should not be either a surface change nor a leaching out of nutrients and also the taste and optical characteristics of the products should not be changed. Therefore, high demands are placed on the cleaning of fruit and vegetables.

The goal of the invention therefore consists of preparing a composition for cleaning contaminated fruit and vegetables with which the pollutants can be removed effectively from the surface of the products, without [impairing] the taste and optical characteristics of the products--in particular, without a leaching out of the nutrients occurring--and their use in foods being satisfactory.

This goal is attained with the features of Patent Claim 1. Advantageous refinements are explained in the subclaims.

As investigations have shown, with chemically very different pollutants, the composition in accordance with the invention leads to a clear reduction of the pollutants in comparison to a

thorough treatment with water, wher in the taste and optical characteristics of the products are fully retained. The composition in accordance with the invention can be used both in the household as well as by the person who cultivates the products.

The composition in accordance with the invention is present in the form of a mixture and consists of raw materials which have been approved for foods. The essential components of the composition in accordance with the invention are neutralized fatty acids, citrate, and ethanol, wherein phosphates and EDTA may perhaps be present.

An essential component of the composition in accordance with the invention is neutralized fatty acids, wherein the fatty acid preferably exhibits 14 to 24 carbon atoms and at least one unsaturated double bond. Preferably, the number of carbon atoms of the unsaturated fatty acid is 16 to 20 carbon atoms, in particular 18 carbon atoms. A particularly suitable fatty acid is oleic acid. Alternately, it is also possible to use saturated fatty acids with 12 to 14 carbon atoms. The carbon atoms of the fatty acids can also be substituted--perhaps with OH groups, so that rhezinolic [unconfirmed translation] acid can also be used as a fatty acid.

The fatty acids are neutralized with NaOH, KOH, primary and tertiary amines, morpholines, or ethylenediamine derivatives. Particularly suitable are primary and tertiary amines--for example, monoethanolamine, triethanolamine, and Quadrol L, {N,N,N',N'-tetrakis(2-hydroxypropyl)ethylenediamine}, which is supplied by the BASF Company. It has become evident that fatty acids with at least one double bond in the fatty acid chain

produce particular advantages in the composition in accordance with the invention during the cleaning of fruit and vegetables, since in this way both a sufficient wetting as well as the redeposition of the pollutants dissolved off the surface can be effectively prevented. This effect is further improved by the use of primary and tertiary amines as a cationic component of the neutralized fatty acids.

Preferably, sodium, potassium, and/or aluminum citrate are used as the citrate. Suitable phosphates are water-soluble phosphates--for example, sodium ortho- and potassium orthophosphate and polymeric phosphates. Phosphate and EDTA are used as complexing agents, wherein EDTA is preferred over the phosphate.

A preferred composition consists of 5 to 25 wt% neutralized fatty acid, 5 to 35 wt% citrate, 3 to 15 wt% ethanol, 0 to 5 wt% phosphate and/or 0 to 5 wt% EDTA, and the rest, water. If phosphate and/or EDTA is used, they are preferably used in a fraction of 1 to 4 wt%.

The composition in accordance with the invention is used in the form of an aqueous solution, which contains 0.05 to 2 wt%, preferably 0.1 to 1 wt% of the composition.

The invention is explained in more detail by an example.

Example

A mixture of 15 wt% oleic acid neutralized with triethanolamine, 30 wt% potassium citrate, 10 wt% ethanol, and 3 wt% potassium orthophosphate, and the rest water to 100%, was prepared. The mixture prepared in this way was diluted with fully deionized water to a concentration of 0.2 wt%. Commercial

lettuce and apples were used as specimen mat rial; they were contaminated before cleaning with a solution of standard lead and cadmium and ethyl parathion simultaneously. The lettuce leaves were weighed and individually stored for the measurement. The apples were peeled and the peelings were stored after quantification for the measurement. The cleaning was carried out by washing with the 0.2% solution or by washing twice with fully deionized water at room temperature.

The heavy metals were determined by subjecting aliquot fractions of the specimen to an acidic pressure digestion and were measured by means of atomic absorption spectrometry. For the determination of the pesticides, aliquot fractions of the specimen were extracted in hot methanol and determined by means of high pressure liquid chromatography. The experiments carried out and the results are summarized in the following table:

Table

Apples

Specimen	Pb mg/kg	Cd mg/kg	Ethyl parathion mg/kg (Folidol)
I	0.27	0.07	6.42
II	0.29	0.037	3.64
III	0.05	0.007	3.74

Lettuce

Specimen	Pb mg/kg	Cd mg/kg	Ethyl parathion mg/kg (Folidol)
I	1.9	0.55	0.187
II	0.1	0.03	0.087
III	<0.03	0.07	0.027

I = Contaminated fruit
II = 2x washing with water
III = Cleaning with composition in accordance with the invention

It was possible to draw the following conclusions from the results of the investigation:

Lead content in apples

After the contamination, the lead content is 0.27 mg/kg and thus 50% below the valid standard value. Whereas the cleaning influence of water is not recognizable, the composition in accordance with the invention reduces the lead content to values which lie below the content of endogenous lead (0.2 mg/kg).

Cadmium content in apples

The composition in accordance with the invention acts considerably better than water with contaminated apples.

Folidol in apples

Here, no significantly better depletion by the composition in accordance with the invention was determined.

Lead content in lettuce

By treating with water and the composition in accordance with the invention, the heavy metals were drastically removed, wherein the specimen in accordance with the invention had a residual lead content below the detection level, which lies below one-third of the water specimens.

Cadmium content in lettuce

In both cases, there is a clear reduction in the cadmium content.

Folidol in lettuce

Applied Folidol is removed from the lettuce approximately by half with water. However, a reduction of around 85% can be attained with the composition in accordance with the invention.

The products treated in accordance with the invention do not exhibit any recognizable optical change and were satisfactory with regard to taste.

Claims:

1. Composition for the cleaning of contaminated fruit and vegetables, consisting of neutralized fatty acids, citrate, ethanol, and perhaps phosphate and/or ethylenediaminetetraacetic acid (EDTA), wherein the components of the compositions have been approved for foods.

2. Composition according to Claim 1, characterized by the fact that the fatty acids have 14 to 24 carbon atoms and at least one unsaturated double bond or represent linear saturated fatty acids with 12 to 14 carbon atoms.

3. Composition according to Claims 1 or 2, characterized by the fact that the unsaturated fatty acids have 16 to 20 carbon atoms.

4. Composition according to one of the preceding claims, characterized by the fact that the fatty acids were neutralized with NaOH, KOH, primary and tertiary amines, morpholines or ethylenediamine derivatives.

5. Composition according to one of the preceding claims, characterized by the fact that the citrate is a sodium, potassium and/or aluminum citrate.

6. Composition according to one of the preceding claims, characterized by the fact that the phosphate is a sodium ortho-, potassium ortho-, or a polymeric phosphate.

7. Composition according to one of the preceding claims, characterized by the fact that it consists of 5 to 25 wt% neutralized fatty acid, 5 to 35 wt% citrate, 3 to 15 wt% ethanol, 0 to 5 wt% phosphate, and/or 0 to 5 wt% EDTA, and the rest, water.

8. Use of the composition according to one of the preceding claims in the form of a 0.05 to 2 wt% aqueous solution.